DRAFT
CEQA
INITIAL STUDY
CALIFORNIA COASTAL CONSERVANCY

PROJECT TITLE: Humboldt Bay Invasive *Spartina* Regional Control and Salt Marsh Restoration Plan

PROJECT PROPONENT AND LEAD AGENCY: State Coastal Conservancy
CASE NO: N/A

PROJECT LOCATION: Brackish marsh, salt marsh, and mudflats in Humboldt Bay, Eel River Delta, and Mad River Estuary, Humboldt County

ZONING & GENERAL PLAN DESIGNATION: Varies. Primarily Natural Resources, Coastal Dependent Industrial, Agriculture

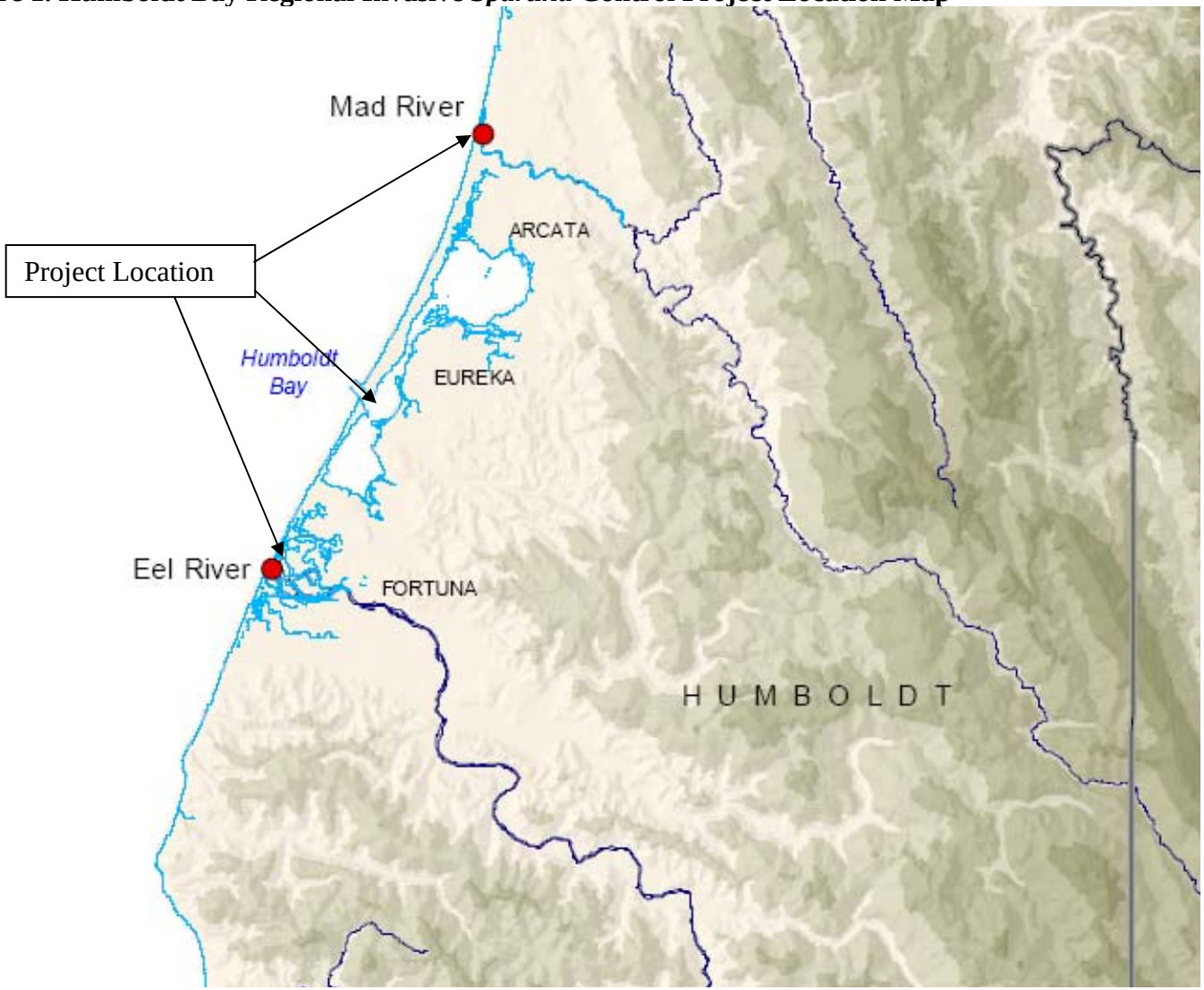
PROJECT DESCRIPTION:
The project involves the removal of invasive *Spartina* (*Spartina densiflora*) and the restoration of native marsh vegetation to salt and brackish marshes in Humboldt Bay, the Eel River Delta and the Mad River Estuary (Figure 1). Invasive *Spartina* is currently found in an estimated 90% of salt marshes in these three adjacent estuaries at varying densities, and in some areas is spreading on to adjacent mudflats. While mapping of the infestation is currently incomplete, between 1,000 and 1,500 acres of salt and brackish marsh in the three estuaries is infested by invasive *Spartina*. The three estuaries support significant acreage of salt marsh, with approximately 900 acres in Humboldt Bay, 560 acres in the Eel River Delta, and <25 acres in the Mad River Estuary. Densities of invasive *Spartina* vary across this area. Some areas contain low-density *Spartina* (<10% cover) intermixed with native species, while other areas support high density *Spartina* (>80% cover) with a low cover of native species such as pickleweed (*Sarcocornia virginica*). Methods to be employed in *Spartina* removal and control could include the following:

- Mechanical removal with handheld metal-bladed brush cutters,
- Mechanical removal with large tracked equipment (e.g. Amphibious bobcat) or using standard excavators working from levees
- Manual removal with hand tools (e.g. shovels, Pulaskis)
- Mowing to reduce seed set
- Covering/blanketing
- Flooding
- Flaming of seedlings using backpack or machine mounted flame-weeders
- Chemical treatment with herbicide (e.g. imazapyr, glyphosate)

Other control techniques with greater efficacy and similar or lesser impacts may also be used if such methods are developed in the future.

Mechanical treatment with handheld metal brushcutters involves the use of brushcutters to mulch

Figure 1. Humboldt Bay Regional Invasive *Spartina* Control Project Location Map



aboveground portions of *Spartina* and to grind up *Spartina* rhizomes in the top few inches of the marsh. 1-3 return treatments are typically necessary to control resprouts. Mechanical treatment with handheld brush cutters would likely be used in areas of low- to medium-density *Spartina* or in small areas of high density *Spartina*, particularly where sensitive plant species are present and avoidance of impacts to these species is feasible using this method. This method may also be used to remove seedlings. It may also be employed in large areas of high density *Spartina* when/where crew labor is readily available. This technique reduces wrack to a relatively fine texture (but not as fine as a mechanized flail mower). The resulting debris doesn't accumulate on the marsh. However, if above ground material is simply mowed rather than mulched, raking and removal of wrack is required.

Mechanical treatment with large tracked equipment would involve the use of an amphibious bobcat with a flail and a rototiller attachment. The flail would cut and mulch aboveground material, while the rototiller would destroy rhizomes in the shallow subsurface soil. The flail may also be able to be deployed below the surface to mulch rhizomes. Debris generated by the flail mower applied to aboveground *Spartina* is ground into very small fragments that are allowed to remain on the marsh surface and be carried by the tides. With the rototiller, most of the wrack remains in place, much of it still attached. Recovery of natives under these circumstances hasn't been tested. Standard tracked excavators may also be used for mechanical excavation of *Spartina* where populations are accessible from levees or upland areas. Control methods based on large tracked equipment would be most applicable to high density, large patches of *Spartina* in areas where the equipment could be staged (e.g. Eureka Marsh west of Highway 101). This method may also be used to remove large patches of seedlings. Excavated or dredged materials would be disposed of in a suitable upland location.

Manual removal includes using hand-tools such as spades, mattocks, or similar tools to dig up *Spartina* plants, including their roots and rhizomes (a horizontal underground stem that sends out roots and shoots from buds). The rhizomes of *Spartina densiflora* are typically located in the top few inches of the substrate, but it may nonetheless be challenging to remove all belowground roots and rhizomes with this method. Re-digging and maintenance would be needed to exhaust rhizome reserves of energy and nutrition, and the population of buds capable of resprouting.

Manual removal may be used in areas with low densities of *Spartina*, particularly when volunteer involvement is feasible and desirable. Manual removal is most effective on isolated seedlings, or clumps, where they are infrequent. Because traversing the marsh and gaining the footing necessary for digging can be challenging in the marsh, this method may be best suited to high elevation marshes. Excavated materials would need to be disposed of in a suitable upland location. Disposal of manually removed materials may also be accomplished with specialized low-ground-pressure equipment (amphibious vehicles), but the number of passes needed to transport materials also increases marsh disturbance.

Manual removal using spades or shovels has been shown to be useful as a late-stage retreatment method, after recovering vegetation has created a nearly closed canopy. In this situation treatment with a brush cutter disturbs and de-vegetates a disproportionately large area compared to the area being treated, which in turn creates safe sites for new seeds. By using spades and focusing down on juvenile plants in this late stage, fewer openings are created. This method is most efficient when employed during late summer when young, juvenile plants that have been previously missed put up easily detected flowering stalks, or in later winter before native plants have greened up. Spartina doesn't go dormant and is easily detected among the dormant and deciduous native species.

Top Mowing with handheld brush cutters or with large tracked equipment may be used to remove seedheads of discrete colonies to reduce seed production. Top mowing is effective at reducing density of *Spartina* and increasing native cover, and so can be used as a temporary measure while a project is

phased. However, it must be followed up with other methods to eradicate *Spartina*. Mown vegetation without viable seeds or propagules should be removed from the site. Mowing to reduce seed set would likely be used in medium- to high-density populations which threaten to disperse seeds to sites in the area where *Spartina* has been or is being removed. Because *Spartina* removal will not occur throughout the project area in one season, mowing to reduce seed set may be helpful to reduce the extent of recolonizing *Spartina* in control areas.

Covering and blanketing is a technique that is aimed at exhausting the reserves of energy and nutrition in *Spartina* roots and rhizomes and increasing environmental and disease stress. Covering typically involves stapling opaque geotextile fabric completely over and around a *Spartina* patch. This excludes light essential to photosynthesis (transformation of solar energy to food energy), and "bakes" the covered grass in a tent of high temperature and humidity. This technique may be used for discrete colonies where the geotextile fabric can be fastened to the marsh surface securely with landscape staples for a sufficiently long period of time. High tides, high winds, and tide-transported debris common in tidal marshes often make this difficult or impossible in some situations. This method is more labor- and materials-intensive than mechanical removal, and is unlikely to be used extensively. *Spartina* that is killed with this technique would be left in the marsh to break down naturally. This technique may be used to kill plants that have been removed manually in areas that are not subject to full tidal influence without having to transport them offsite.

Flooding entails constructing temporary dikes or other structures to impound standing water to kill emergent vegetation. *Spartina* is intolerant of permanently flooded conditions (Mateos-Naranjo et al. 2007). Diked flooded salt marshes would eliminate existing standing vegetation, but are readily re-colonized by youthful salt marsh vegetation if the diking is brief. Isolating the treatment area for flooding may be accomplished by deploying temporary dikes or by temporarily closing openings in existing dikes. Temporary constructed dikes need not be large to accomplish treatment. Water-filled geotextile tubes ("inflatable dams"), analogous with inflatable cofferdams used in aquatic construction/dewatering operations, could be deployed around large colonies of *Spartina* within open marsh plains. Upon completion of treatment, inflatable dams would be removed. *Spartina* that is killed with this technique would be left in the marsh to break down naturally. This method would be used opportunistically where large, high density *Spartina* populations are vulnerable to diking that would not be excessively expensive or logistically difficult. This technique is not expected to be used extensively.

Flaming of seedlings using backpack or machine mounted flame-weeders may be used to control seedlings recolonizing control sites. *Spartina densiflora* has a persistent seed bank, and flushes of seedlings in control sites during the first years after control occur either from the seed bank or from newly-dispersed seeds. *Spartina* control will be phased, and seed may disperse from uncontrolled sites to controlled sites. Seedlings may be killed with a low-intensity flame weeder during the early stage of their development. This treatment is especially efficient when seedlings are occurring at high density on otherwise bare mud. However, it can also be used to target clusters of seedlings occurring among native species. The native species are more resistant and can recover from the mild singeing. This method is only viable when seedlings are new and small, in the size range of several inches.

Chemical treatment could occur via backpack sprayer, or power sprayer from a boat or truck. Applications from backpack sprayers or conventional spray truck entails workers walking through the marsh and applying herbicide directly to target plants, with limited overspray to surrounding plants or water surfaces. Spot application from amphibious tracked vehicles or boats would entail vehicles moving through the marsh or adjacent waterway applying herbicide with hand-held equipment to target vegetation with limited overspray. *Spartina* that is killed with this technique would be left in the marsh to break down naturally.

Imazapyr may be used alone or mixed with glyphosate, following label instructions. An imazapyr/glyphosate mixture has been utilized effectively to control *S. densiflora* in Gray's Harbor, Washington by the Washington State Department of Agriculture (Mikkelsen 2010). Glyphosate would provide a brown-down indicator to allow for more rapid detection of missed or skipped areas. Since imazapyr is such a slow-acting herbicide, it is difficult to know if the entire infestation at a site has been effectively treated until the following spring. Glyphosate treatment results in more noticeable yellowing/browning of the treated plants within two weeks. The use of a brown-down indicator would make any green, untreated plants stand out, and a follow-up spot treatment could be applied to these plants without losing a year of control. In addition to the efficacy of glyphosate as a brown-down indicator, experience utilizing glyphosate/imazapyr mixtures in Washington State and the San Francisco Estuary suggest that the combination may achieve a higher mortality rate for *Spartina* than either herbicide used alone. Utilizing a glyphosate/imazapyr mixture may also reduce the probability that *Spartina* will develop resistance to imazapyr. Herbicide application would occur when *Spartina* is sufficiently active metabolically to facilitate translocation of the herbicides to all parts of the plant, approximately April-November. It is possible that damage to non-target plants could be minimized by applying herbicides when *Spartina* is metabolically active and other species are dormant or have senesced. This possibility will be explored. Chemical application at a specific site would typically occur once a year. A second follow-up treatment targeting missed plants could occur in the same year.

Chemical treatment may be used in moderate- to high-density *Spartina* areas. Chemical treatment may be particularly suitable for areas that are difficult to access, such as portions of the Eel River Delta, where repeated visits for mechanical treatment would be logistically difficult. Chemical treatment may also be used in areas with sensitive wildlife species that could be disturbed by the repeated visits necessary for mechanical treatment. Chemical treatment would be minimized near residential and commercial areas, and in areas that do not receive regular tidal flushing, where the dilution and photodegradation of imazapyr could be significantly slower (Kegley 2008).

Description of herbicides and additives

Imazapyr. Habitat® or Polaris™ are solutions of 28.7% isopropylamine salt of imazapyr in water, equivalent to 22.6% imazapyr acid equivalents (a.e.) or 2 lbs. acid per gallon, and contain a small amount of an acidifier. Because Habitat® is purportedly the same formulation as Arsenal® and this product contains acetic acid, the acidifier in Habitat® is likely also acetic acid (Leson & Associates 2005.) No information has been found in the published literature on manufacturing impurities associated with imazapyr. Because virtually no chemical synthesis yields a totally pure product, technical grade imazapyr most likely contains some impurities. However, to some extent, concern for impurities in technical grade imazapyr is reduced by the fact that most existing toxicity studies on imazapyr were conducted with the technical grade product and encompass the toxic potential of the impurities (SERA 2004). A generic version of this aquatic imazapyr formulation is now available from NuFarm under the product name Polaris AQ™. Imazapyr inhibits an enzyme in the biosynthesis of the three branched-chain aliphatic amino acids valine, leucine, and isoleucine. Animals do not synthesize branched chain aliphatic amino acids, but obtain them from eating plants and other animals. Therefore, the engineered mechanism for plant toxicity, i.e. the interruption of protein synthesis due to a deficiency of the amino acids valine, leucine, and isoleucine, does not adversely impact to birds, mammals, fish or invertebrates. Any toxicity to animals occurs through different mechanisms. (Entrix 2003, p. 24.) Caffeine, aspirin and table salt are toxic to animals at lower amounts than imazapyr. At the standard application rate of 1.5%, an average-sized person would have to drink 25 gallons (400 cups) of imazapyr mixture to reach lethal levels. At the highest application rate, an applicator would have to wear a contaminated glove for 50 hours or 2 days to reach a level of concern. Consequently, U.S. EPA and the State of California also place no post-treatment restrictions on recreational use of the adjacent surface waters for swimming or fishing. Imazapyr is relatively slow acting and it takes several

weeks for the plants to show effects. Plants cease to grow initially in the roots and later in the aboveground portions. (Cox 1996 in Entrix 2003, p. 24.) On *Spartina*, it takes 4-8 weeks after treatment for effects, i.e. yellow flagging of the leaf margin, to show, and complete plant death can take several months. (Patten 2003.) Imazapyr appears to be less effective for control of *S.densiflora* than for *S. alterniflora*, but can nevertheless result in significant mortality and reduced seed set for *S. densiflora* (Drew Kerr, personal communication).

Glyphosate. Aquamaster® and Rodeo® are aqueous solutions containing 53.8% glyphosate in its isopropylamine salt form or 4 lbs. acid per gallon, and contain no inert ingredients other than water. The primary decomposition product of glyphosate is aminomethylphosphonic acid (AMPA), and the commercial product contains an impurity, 2,4-nitrosoglyphosate (NNG). The potential effects of AMPA and NNG are encompassed by the available toxicity data on glyphosate and glyphosate formulations (SERA 1997). Although it is highly toxic to plants, glyphosate has exceptionally low toxicity to mammals, birds, and fish. Glyphosate inhibits an enzyme (5-enolpyruvylshikimic acid-3-phosphate synthase) needed to synthesize an intermediate product in the biosynthesis of the three aromatic amino acids (tyrosine, tryptophan, and phenylanine). These amino acids are important to the synthesis of proteins that link primary and secondary metabolism. Animals do not synthesize these aromatic amino acids but obtain them by eating plants and other animals. Glyphosate therefore has low toxicity to these receptors (Schuette 1998). In general, glyphosate herbicides are somewhat faster acting than imazapyr herbicides. On *Spartina*, complete brown-down occurs within 7 to 21 days (K. Patten, pers. comm. 2004).

Both imazapyr and glyphosate herbicides are systemic broad-spectrum herbicides that are applied to, and absorbed by, roots and foliage and are rapidly transported via the plant's phloem and xylem to its meristematic tissues or growing regions. (Uptake via roots is irrelevant under estuarine conditions because herbicide applications occur onto shoots and foliage.) Because *Spartina* can spread via rhizomes and tillers, the translocation of the herbicide into the rhizomes and tillers and their ensuing cell death effectively prevents further spreading of the clone once the aboveground portion of the plant has died.

Surfactants and colorant. The herbicides would be mixed with a surfactant to facilitate absorption by *Spartina*. The surfactant to be used would be either lecithin [soy bean] based (Liberate), or a methylated vegetable oil (Competitor). No surfactants containing nonylphenol ethoxylate would be used, because of the potential for endocrine disruption in fish. A harmless, inert colorant would also be used to help indicate which areas have been sprayed. The colorant to be used would likely be Blazon® Spray Pattern Indicator "Blue" ("Blazon® Blue"), which has been used successfully in the San Francisco Estuary control program. Blazon® Blue is a water-soluble non-ionic polymeric colorant. As with most colorant products, the active ingredients are proprietary; the Material Safety Data Sheet ("MSDS") only indicates that it is non-hazardous and non-toxic. The product information sheet reports that the product is non-staining to the skin or clothing. The colorant is typically added at a rate of 3 quarts per 100 gallons of solution, or 16 to 24 ounces per acre sprayed.
Depending on the application method, Habitat® or Polaris™ tank mixes will be applied with varying concentrations at 1 to 1.5 pounds of the active ingredient imazapyr (as acid equivalent) per acre (lb imazapyr a.e. /acre). High-volume handheld sprayers will typically use a spray volume of 100 gallons per acre (gal/acre). Low-volume directed sprayers will use about 20 gal/acre. Application of imazapyr herbicide would follow the guidelines and precautions set forth below.

Imazapyr/Glyphosate Mixtures. According to the product labels for Rodeo®,Aquamaster®, Habitat®, and Polaris™, these products may be combined with other herbicides. Aquamaster® and Habitat® or Polaris™ may be combined for the project in order to achieve certain objectives.

The concentrations and application rates for mixtures of imazapyr, surfactant, and colorant proposed to be used by the Project are shown in Table 1. Table 2 shows the maximum concentrations and application rates of glyphosate, surfactants and colorants to be used in glyphosate/imazapyr mixtures. The exact herbicide solution concentration, the choice of surfactants and colorants, and the determination of application rates will be based on site-specific conditions and will be described in the Site-specific Plans, which will be developed annually as part of the project.

Revegetation, Monitoring, and Phasing of the Project
Native marsh species may be planted in some areas after *Spartina* control is complete to facilitate marsh restoration, but passive revegetation is expected to occur rapidly in most areas. *Spartina* control is expected to be phased over several years, with control in Humboldt Bay occurring first, followed by control activities in the other two estuaries. Control activities in each area will be concentrated in the first season of treatment. However, follow-up control for several years is expected to be necessary to remove seedlings germinating from the seed bank and to control individuals missed in the initial treatment or regenerating from vegetative fragments or rhizomes. The project would include baseline data collection to determine the extent and characteristics of *Spartina* populations in portions of the project area, and follow-up monitoring to track the efficacy of *Spartina* control and the rate of native marsh recovery. Control areas would be accessed by boat, by foot from adjacent roads, and by amphibious tracked vehicles designed to minimize impacts to wetlands (e.g. Argo).

It is expected that the Humboldt Bay Harbor, Recreation and Conservation District (HBHRCD) will coordinate the control and eradication activities. The Conservancy will provide scientific and permitting support and may fund some of the control and eradication activities. The FWS is expected to provide scientific and logistical support for eradication activities, as well.

PROJECT NEED:
Invasive *Spartina* is known to displace native vegetation, reducing the biodiversity of the salt marsh dramatically. No native *Spartina* species are found in the Humboldt Bay region. A 1997 U.S. Fish and Wildlife Service (FWS) study reported a dramatic increase in *Spartina* frequency over the previous 10 years in the Mad River Slough Unit of the Humboldt Bay National Wildlife Refuge (HBNWR), supporting the concern that *Spartina* threatens to increase its disruption of the Bay ecosystem. In 1998 and 1999, the FWS undertook mapping and observations of *Spartina* and of two rare high salt marsh plants, Humboldt Bay owl's clover (*Castilleja ambigua* var. *humboldtiensis*) and Point Reyes bird's beak (*Cordylanthus maritimus* ssp. *palustris*). The study looked at all three plants because *Spartina* had been observed to be encroaching upon the same salt marsh elevations at which the two rare plants are found. The FWS' February 2001 report[1] on its findings noted among management implications that the "dense-flowered *Spartina* continues to be a major threat to biological diversity" and that "identifying and applying control measures for this invasive plant is of the highest priority." Mapping of Humboldt Bay salt marsh in 1998 and 1999 indicated that over half of the total salt marsh consisted of nearly pure stands of *Spartina*, and the species was present in much of the remaining salt marsh, as well. The 1998-1999 mapping also showed that, while *Spartina* is most abundant at mid-marsh elevations in Humboldt Bay, it is spreading to the high marsh, where it threatens to displace populations of Humboldt Bay Owl's Clover and Point Reyes Bird's Beak. A recent report on the *Status of Perennial Estuarine Wetlands in the State of California*[2] (Sutula et al. 2008) stated that improving biological conditions in the North Coast region requires controlling invasive *Spartina*, because its increasing dominance will decrease the structural complexity and species richness of estuarine wetlands.

While *Spartina* is most common in Humboldt Bay in salt and brackish marshes, its presence has also

[1] Available at http://www.fws.gov/humboldtbay/*Spartina*.html
[2] Available at www.sccwrp.org

Table 1: Imazapyr herbicide mixture component concentrations and application rates for treatment of non-native *Spartina densiflora* in Humboldt Bay Region

Application Method	Spray Volume	Habitat® or Polaris®	Active Ingredient Imazapyr*	Surfactant**	Colorant
High volume hand-held sprayer (boat or truck application)	100 gal/acre	0.52-0.75% solution 4-6 pints/100 gal	1-1.5 lb a.e./acre	1 qt/100 gal NIS with ≥70% a.i.; ~1% MSO or VOC	3 qt/100 gal
Low-volume directed sprayer (backpack application)	20 gal/acre	0.75-1. 5% solution 1.2-2.4 pints/20 gal	0.3-0.6 lb a.e./acre	1 qt/100 gal NIS with ≥70% a.i.; ~1% MSO or VOC	3 qt/100 gal

* Active ingredient in Habitat® and Polaris® is imazapyr isopropylamine salt; values expressed as imazapyr acid equivalent (a.e.) ** a.i. = active ingredient; NIS = non-ionic surfactant; MSO = methylated seed oil; VOC = vegetable oil concentrate, SBS = silicone-based surfactant

Table 2: Glyphosate herbicide mixture component concentrations and application rates for treatment of non-native *Spartina densiflora* in Humboldt Bay Region

Application Method	Spray Volume	Aquamaster® or Rodeo®	Active Ingredient Glyphosate*	Surfactant**	Colorant
High volume hand-held sprayer (boat or truck application)	100 gal/acre	1-2% solution 1-2 gal/100 gal	4-8 lb a.e./acre	≥2 qt/100 gal NIS with ≥50% a.i.	3 qt/100 gal
Low-volume directed sprayer (backpack application)	25-200 gal/acre	1-8% solution 1-8 gal/100 gal	1.35-10.8 lb a.e./acre	≥2 qt/100 gal NIS with ≥50% a.i.	3 qt/100 gal

* The active ingredient in Rodeo® and Aquamaster® is glyphosate isopropylamine salt; values are expressed as glyphosate acid equivalent (a.e.)
** a.i. = active ingredient; NIS = non-ionic surfactant

been increasingly noted on mudflats and on sand spits, and it has the potential to spread in these environments. Studies have been initiated to identify ecosystem-level impacts of this invasion, including effects on net ecosystem primary productivity and possible shifts in trophic foodwebs. As a tall, dense graminoid invading a native, more open mat-like plant community, Spartina may alter light penetration, causing shifts from autotropohic to heterotrophic food webs. Preliminary studies at Humboldt Bay point toward the likelihood that Spartina invasion reduces the diversity and abundance of terrestrial invertebrates. It may also alter sedimentation rates in Humboldt Bay and neighboring estuaries. In other estuaries, the invasive members of the genus have been shown to act as "ecosystem engineers," bringing about drastic changes to ecosystem functions. In addition to its direct impacts, the dominance of invasive *Spartina* in Humboldt Bay has slowed efforts at marsh restoration because of fears that restored marshes will become dominated by *Spartina*, compromising their habitat value. In addition to its impacts locally to these estuaries, *Spartina* in Humboldt Bay and adjacent estuaries threatens to colonize other west coast estuaries via ocean dispersal of its seeds, as demonstrated by the preliminary results of a drift card study carried out by Portland State University. Drift cards from Humboldt Bay in 2004 and 2005 were found within a month of their release in numerous locations along the Oregon Coast, as well as in southwest Washington. The 2007 West Coast Governors' Agreement on Ocean Health Action Plan[3] calls for the west coast-wide eradication of invasive *Spartina* by the year 2018.

Work in several west coast estuaries including San Francisco Bay, California and Willapa Bay, Washington, has shown that a prerequisite to successful eradication of invasive *Spartina* is a coordinated, regional approach. Since the species disperses primarily by seed, it is necessary to greatly reduce seed production within the control area and any source populations. Eradication can then be achieved once the seed bank is exhausted. Experiences in other west coast estuaries have shown that the local community must be educated and supportive for such an eradication program to succeed. This is especially true when some salt marshes are under private ownership, as is the case in Humboldt Bay and adjacent estuaries.

In San Francisco Bay and in Washington and Oregon, successful eradication has involved the use of the herbicide imazapyr as part of an Integrated Pest Management strategy that also includes mechanical methods. It should be noted, however, that the San Francisco Bay and Willapa Bay (Washington) invasions consist primarily of *Spartina alterniflora*. Imazapyr has not proven to be as effective on *S. densiflora* in San Francisco Bay as it has on *S .alterniflora*, although a combination of herbicide treatment following mechanical methods has proven to be effective.

The FWS staff at the HBNWR has been working for over four years cooperatively with the Conservancy to develop mechanical *Spartina* control techniques. Pilot control efforts between 2002 and 2009 resulted in the eradication of virtually all mature *Spartina* in a 35-acre treatment area adjacent to the Mad River Slough. This work has shown that mechanical methods can be used successfully at this scale, and over a larger area as part of an IPM strategy. It has also demonstrated the need for an aggressive, regional approach to successfully eradicate *S. densiflora* relatively quickly in order to prevent re-invasion in Humboldt Bay and its spread to other locations along the west coast. In 2010, the HBNWR initiated an effort to remove *Spartina* from 300 acres of refuge lands in Humboldt Bay using mechanical methods. This effort has relied on the use of handheld brushcutters in 2010, and may employ large tracked equipment in 2011.

LEAD AGENCY/CONTACT: California State Coastal Conservancy, 1330 Broadway, 13th floor, Oakland, CA 94612-2530. Joel Gerwein, Project Manager. Email: jgerwein@scc.ca.gov. Tel: 510-286-4170.

[3] Available at http://westcoastoceans.gov/

SETTING AND SURROUNDING LAND USES:

Humboldt Bay

As California's second largest natural bay and the largest estuary on the Pacific coast between San Francisco Bay and Coos Bay, Oregon, Humboldt Bay is a complex ecosystem and valuable resource for California and the nation because of its natural resources, its aesthetic appeal and recreational opportunities, its ecological services, economic benefits, and its vital transportation links. Visitors and Humboldt County residents alike value Humboldt Bay for its natural and man-made attributes. The biota associated with Humboldt Bay is diverse and ecologically significant at scales ranging from a local focus on fisheries to a participation in hemispheric ecological patterns such as shorebird and waterfowl migration. The Humboldt Bay area hosts over 400 plant species, 300 invertebrate species, 100 fish species, and 260 bird species, including those that rely on the bay as they travel the Pacific Flyway. Recent studies indicate the importance of the Bay in the life cycles of commercially and recreationally important fish species, and the general level of biological vitality in the Bay has been identified as an important aesthetic and quality-of-life variable for both residents and visitors to the area. Bountiful aquatic organisms support commercial and sport finfishing and shellfishing, and the Bay supports many other water dependent and water-related activities. Humboldt Bay has a significant oyster culture industry, producing about 70% of the oysters grown in California. Portions of the diked former tidelands around the Bay, particularly in the Arcata Bottoms, are utilized for agriculture, primarily livestock grazing for dairy and beef production. Arcata, located on Humboldt Bay's northern section, is home to approximately 16,651 people; Eureka, in the central portion of the Bay, has a population of about 25,866; and Loleta/Table Bluff, in the southern section of the Bay, supports about 750 people.

Significant portions of the Humboldt Bay tidelands and former tidelands are protected as part of the California Department of Fish and Game's Mad River Slough, Fay Slough, and Elk River Wildlife Areas, the US Fish and Wildlife Service Humboldt Bay National Wildlife Refuge, the Bureau of Land Management's South Spit Cooperative Management Area, the City of Eureka's Elk River Wildlife Sanctuary, PALCO Marsh and adjacent marshes, and the City of Arcata's Arcata Marsh and Wildlife Sanctuary During the late-nineteenth and early twentieth centuries, diking and filling reduced Bay salt marshes from an estimated 9,000 acres to only 900 acres today. Bay habitat has been further disturbed by discharges of agricultural and urban runoff, industrial and recreational uses, and colonization by invasive *Spartina*.

Eel River Estuary

The estuarine channel of the Eel River flows into the Pacific Ocean approximately 14 miles south of the town of Eureka in Humboldt County. The Eel River Estuary includes approximately 24 square miles of delta lands, wetlands, and estuarine channels that receive runoff from 3,700 square miles of the mountainous Eel River Basin. It is considered one of the most significant estuaries along the entire California Coast, and its mosaic of tidal flats, sloughs, marshes and seasonal wetlands supports hundreds of thousands of resident and migratory waterfowl. Approximately 560 acres of salt marsh are present in the estuary today. Approximately 5,200 additional acres of salt marsh that were present in the estuary in 1855 have been lost due to diking, filling, and other human activities. Invasive dense-flowered *Spartina* has been noted to be widespread in the marshes of the Eel River estuary, but *Spartina* distribution in this area has not yet been mapped. The Eel River was designated as a Critical Coastal Area (CCA) in 1995, as a waterbody impaired by excessive sediment and temperature that flows into an estuary. Located in the Eel River delta are the City of Ferndale, with an estimated population of 1,400, (U.S. Census Bureau 2000), and the unincorporated community of Loleta. Land use in the region includes gravel mining, dairy, timber harvest, and recreation.

Mad River Estuary

The Mad River estuary is located just north of Arcata. Like the Eel River, the Mad River was designated

as a CCA in 1995, as a waterbody impaired by excessive sediment, temperature, and turbidity that flows into an estuary. The Mad River estuary is smaller than the Humboldt Bay and Eel River estuaries, and contains a smaller acreage of tidal marsh. It is an extremely dynamic ecosystem, as evidenced by significant migration of the mouth of the Mad River up and down the coast since the 1940s. Between 1942 and 1992, the Mad River mouth moved from a location approximately across from present-day School Road in McKinleyville to just below the Clam Beach Vista Point across from the McKinleyville airport.

The river inlet remained in the vicinity of the vista point until 1998, when storm discharge breached a new inlet approximately 1.5 miles to the south in the vicinity of the 1969 location. The river inlet has gradually migrated northward since 1998, reaching the vicinity of Murray Road in 2008 (Mad River Watershed Assessment 2010). The abandoned channel became a lagoon/estuary with a mixture of freshwater and brackish marshes, fed by Widow White Creek and subject to high tides entering the new mouth of the river. The estuary provides critical nursery habitat for juvenile coho and Chinook salmon and steelhead (Mad River Watershed Assessment 2010). It also supports populations of western snowy plover. Invasive *Spartina* is present in this estuary, in marshes and flood channels, and in and adjacent to riparian scrub habitat. As is the case with the Eel River estuary, the *Spartina* population in the Mad River estuary has not been mapped.

OTHER PUBLIC AGENCIES AND TRIBAL GOVERNMENTS WHOSE APPROVAL IS, OR MAY BE REQUIRED (e.g. permits, financing approval, or participation agreement.): City of Eureka, City of Arcata, City of Ferndale, County of Humboldt, California Coastal Commission, Humboldt Bay Harbor, Recreation and Conservation District, California State Lands Commission, U.S. Army Corps of Engineers, Regional Water Quality Control Board, California Department of Fish and Game, U.S. Bureau of Land Management, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Wiyot Tribe

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED: The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

❑ Aesthetics	❑ Agricultural Resources	☑ Air Quality
☑ Biological Resources	❑ Cultural Resources	☑ Geology/Soils
☑ Hazards/Hazardous Materials	☑ Hydrology/Water Quality	❑ Land Use/Planning
❑ Mineral Resources	❑ Noise	❑ Population/Housing
❑ Public Services	❑ Recreation	❑ Transportation/Traffic
❑ Utilities/Service Systems	❑ Mandatory Findings of Significance	

DETERMINATION: On the basis of this initial evaluation:

❑ I find that the proposed project **could not** have a significant effect on the environment, and a **NEGATIVE DECLARATION** will be prepared.

❑ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A **MITIGATED NEGATIVE DECLARATION** will be prepared.

☑ I find that the proposed project **may** have a significant effect on the environment, and an **ENVIRONMENTAL IMPACT REPORT** is required.

❑ I find that the proposed project **may** have a "potentially significant impact" or 'potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been

adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An **ENVIRONMENTAL IMPACT REPORT** is required, but it must analyze only those effects that remain to be addressed.

❑ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier **EIR** or **NEGATIVE DECLARATION** pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier **EIR** or **NEGATIVE DECLARATION**, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

_____ _____

Sam Schuchat Date
Executive Officer
California State Coastal Conservancy

CHECKLIST AND EVALUATION OF ENVIRONMENTAL IMPACTS: An explanation for all checklist responses is included, and all answers take into account the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts. The explanation of each issue identifies (a) the significance criteria or threshold, if any, used to evaluate each question; and (b) the mitigation measure identified, if any, to reduce the impact to less than significant. In the checklist below the following definitions are used:

"**Potentially Significant Impact**" means there is substantial evidence that an effect may be significant.

"**Potentially Significant With Mitigation Incorporated**" means the incorporation of one or more mitigation measures can reduce the effect from potentially significant to a less than significant level.

"**Less Than Significant Impact"** means that the effect is less than significant and no mitigation is necessary to reduce the impact to a lesser level.

"**No Impact"** means that the effect does not apply to the proposed project, or clearly will not impact nor be impacted by the project.

I. AESTHETICS. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect on a scenic vista?		X		
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway?		X		
c) Substantially degrade the existing visual character or quality of the site and its surroundings?		X		
d) Create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area?				X

THRESHOLDS OF SIGNIFICANCE: This Initial Study considers whether the proposed project may have any significant effects on visual aesthetics because of: (a) the short-term or long-term presence of project-related equipment or structures; (b) project-related changes in the visual character of the project area that may be perceived by residents or visitors as a detraction from the visual character of the project area; (c) permanent changes in physical features that would result in the effective elimination of key elements of the visual character of the project area near a State scenic highway; or (d) the presence of short-term, long-term, or continuous bright light, such as from welding or nighttime construction, that would detract from a project area that is otherwise generally dark at night or that is subject to artificial light.

DISCUSSION: The project will have a short-term adverse effect on the scenic quality of salt and brackish marshes in the area. Control efforts are expected to either remove or kill standing vegetation, temporarily transforming *Spartina*-dominated marsh vistas to mudflat-dominated vistas if mechanical treatment is used, or marshes dominated by dead vegetation if chemical treatment is used. Live *Spartina* normally retains a significant fraction of dead leaves, which would reduce the change between live *Spartina* and dead *Spartina*. Substantial revegetation by native marsh plants is expected to occur within two years. Potential aesthetic impacts could be mitigated by posting educational signage in high public-use areas, such as the Arcata Marsh and Wildlife Sanctuary. The signage would explain *Spartina*'s ecological impacts and describe the project. Increased public understanding of the project would improve the public's emotional

reaction to the temporary adverse change to the scenic marsh vista.

Therefore, based on the conclusions above, Staff finds that that the project will not result in significant adverse aesthetic impacts after mitigation.

II. AGRICULTURE RESOURCES. In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?				X
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?				X
c) Involve other changes in the existing environment, which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use?			X	

THRESHOLDS OF SIGNIFICANCE: This Initial Study considers to what degree the proposed project would: (a) change the availability or use of agriculturally important land areas designated under one or more of the programs above; (b) cause or promote changes in land use regulation that would adversely affect agricultural activities in lands zoned for those uses, particularly lands designated as Agriculture Exclusive or under Williamson Act contracts; or (c) change the availability or use of agriculturally important land areas for agricultural purposes.

DISCUSSION: Farmland is located adjacent to *Spartina*-infested marshes, particularly in the Eel River Delta and the Arcata Bottoms. The majority of farmland in the project vicinity is grazing land for dairy and beef production. In many cases, *Spartina* is present in tidally-influenced drainage channels and near the edges of pastures. However, removal of *Spartina* is not expected to disrupt agricultural production in these areas. Temporary livestock removal from control areas may be necessary, but adjacent pasture areas should be available, if necessary. Therefore the project will have a minor, temporary, less than significant impact on farmlands or agricultural lands.

III. AIR QUALITY. Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Conflict with or obstruct implementation of the applicable air quality plan?	X			
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	X			
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable Federal or State ambient air quality standard (including releasing emissions, which exceed quantitative thresholds for ozone precursors)?	X			

d) Expose sensitive receptors to substantial pollutant concentrations?	X			
e) Create objectionable odors affecting a substantial number of people?			X	

THRESHOLDS OF SIGNIFICANCE: This Initial Study considers to what degree the proposed project would (a) directly interfere with the attainment of long-term air quality objectives identified by the North Coast Unified Air Quality Management District; (b) contribute pollutants that would violate an existing air quality standard, or contribute to a non-attainment of air quality objectives in the project's air basin; (c) produce pollutants that would contribute as part of a cumulative effect to non-attainment for any priority pollutant; (d) produce pollutant loading near identified sensitive receptors that would cause locally significant air quality impacts; or (e) release odors that would affect a number of receptors.

DISCUSSION: The North Coast Unified Air Quality Management District (NCUAQMD) is responsible for monitoring and enforcing local and State air quality standards. Air quality standards are set for emissions that may include, but are not limited to: visible emissions, particulate matter, and, fugitive dust. Pursuant to Air Quality Regulation 1, Chapter IV, Rule 400 – *General Limitations*, a person shall not discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance or annoyance to any considerable number of persons or to the public or which endanger the comfort, repose, health or safety of any such persons or the public or which cause or have a natural tendency to cause injury or damage to business or property.

Visible emissions are fairly self-explanatory. They include emissions that are visible to the naked eye, such as smoke from a fire. The project does not involve any visible emissions.

With regard to particulate matter, all of Humboldt County has been designated by the California State Air Quality Board as being in "non-attainment" for PM-10 air emissions. PM-10 air emissions include chemical emissions and other inhalable particulate matter with an aerodynamic diameter of less than 10 microns. PM-10 emissions include smoke from wood stoves and airborne salts and other particulate matter naturally generated by ocean surf. Because, in part, of the large number of wood stoves in Humboldt County and because of the generally heavy surf and high winds common to this area, Humboldt County has exceeded the State standard for PM-10 air emissions. Therefore, any use or activity that generates unnecessary airborne particulate matter may be of concern to the NCUAQMD. The use of mechanical control may result in the release of small particulate matter from the engines of handheld brushcutters and mechanical tracked equipment. The amount of small particulate matter that will be released is not expected to be large enough to significantly add to the PM-10 non-attainment.

Wrack generated by mechanical control methods is typically ground to small size and allowed to remain on the marsh and to be carried by the tides. However, it is possible that under some circumstances, it may be desirable to burn piles of *Spartina* wrack generated by mechanical control, or to burn dead *Spartina* remaining after chemical control. Air quality impacts from burning will be evaluated as part of the EIR.

Control efforts are not expected to expose sensitive receptors to significant pollutant levels. Herbicide would only be applied in locations and conditions when exposure of sensitive receptors, such as schools, residential areas, hospitals, and senior centers, would be highly unlikely to occur. However, the potential for sensitive receptor exposure from herbicide application and burning of wrack and the specific conditions under which application and burning could occur and locations at

which it could occur needs to be fully evaluated.

With regard to objectionable odors, the project does not propose any control methods that will result in odors that could reasonably be considered objectionable by the general public.

Based on the conclusions above, the project will not result in adverse air quality impacts, nor result in a cumulatively considerable increase in the PM-10 non-attainment.

IV. BIOLOGICAL RESOURCES. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	X			
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	X			
c) Have a substantial adverse effect on Federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?		X		
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	X			
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?			X	
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State habitat conservation plan?			X	

THRESHOLDS OF SIGNIFICANCE: This Initial Study considers whether the proposed project would result in a significant adverse direct or indirect effects to: (a) individuals of any plant or animal species (including fish) listed as rare, threatened, or endangered by the Federal or State government, or effects to the habitat of such species; (b) more than an incidental and minor area of riparian habitat or other sensitive habitat (including wetlands) types identified under Federal, State, or local policies; (c) more than an incidental and minor area of wetland identified under Federal or State criteria; (d) key habitat areas that provide for continuity of movement for resident or migratory fish or wildlife, or (e) other biological resources identified in planning policies adopted by the City of Eureka.

DISCUSSION:

The project is expected to be beneficial in the long-term to special status species. *Spartina densiflora* competitively excludes other plant species, including rare marsh plants such as Humboldt Bay owl's clover (*Castilleja ambigua* ssp. *humboldtiensis*) and Point Reyes bird's beak

(*Cordylanthus maritimus* ssp. *palustris*). *S.densiflora* is also thought to have negative impacts on wildlife that utilize salt and brackish marshes by reducing the structural diversity of native marsh through establishment of a near-monoculture (Sutula et al. 2008). *S.densiflora* has also invaded the understory of tidally influenced riparian habitat in the Mad River Slough and Mad River Estuary, where it may be adversely affecting plants and wildlife that depend on riparian habitat.

A search of the California Native Plant Society's Rare Plants Inventory indicated that 30 special status plant species have the potential to occur in salt or brackish marshes or riparian areas in the project vicinity. The special status plants database search was for all of Humboldt County. At least three special status plant species, Humboldt Bay owl's clover, Point Reyes bird's beak, and Lyngbye's sedge (*Carex lyngbyeii*), are known to occur in or adjacent to *Spartina*-infested marshes. These species could be impacted by control efforts. Impacts could occur through mechanical control, which may result in impacts to non-target species when dense stands of *Spartina* are found together with a low cover of native species, such that control of *Spartina* cannot be achieved without impacts to non-target plants. Impacts could also occur through the use of a broad spectrum herbicide such as imazapyr if special status plant species are found in close proximity to *Spartina* or if overspray occurs. Impacts to sensitive plant communities (salt and brackish marsh and riparian) could occur through mortality of non-target plant species as a result of herbicide or mechanical treatments, and through erosion and soil disturbance as a result of mechanical and manual control. Special status plant surveys will be conducted in each specific area before control efforts are conducted there, and impacts to special status plant species will be avoided or minimized by flagging special status plant occurrences and restricting access and control areas to avoid special status plants wherever possible. Where possible, control activities in areas with special status species will be carried out in the fall, after Point Reyes bird's beak and Humboldt Bay owl's clover have set seed.

Monitoring in a 35 acre control area in the Humboldt Bay National Wildlife Refuge Ma-le'l Dunes Unit, adjacent to the Mad River Slough, indicates that populations of Point Reyes bird's beak and Humboldt Bay owl's clover greatly increased in abundance four years following the initiation of control efforts compared to population levels before control.

A search of the CNDDB database for Humboldt County identified 34 special status wildlife species that could occur on or near the project area, and that utilize salt or brackish marshes or riparian areas, or are aquatic species potentially occurring in creeks or estuaries adjacent to the project area. Aquatic species occurring in creeks and estuaries include tidewater goby (*Eucycloglobius newberryi*), coho salmon (*Oncorhyncus kisutch*), Chinook salmon (*O. tshawytscha*), and steelhead trout (*O.mykiss*). The project is expected to have two primary impacts on wildlife. The first impact would be a temporary loss of roosting habitat by converting *Spartina* marshes to largely unvegetated marsh for 1-2 years. However, this temporary impact would be mitigated by the project's restoration of native marsh vegetation, which will provide higher habitat value for native wildlife species. The second impact would be a temporary increase in fine sediment input from control marshes into adjacent creeks, sloughs, tidal channels, and estuaries, which may temporarily degrade habitat for aquatic species such as those listed above. However, increased fine sediment inputs resulting from project activities may be less than significant in the context of the project area sediment budget. Additional data on the sediment budget of the project area would need to be evaluated in order to make this determination. The magnitude of these impacts is reduced by the phased nature of the project; *Spartina* control will not occur throughout the project area in a given year.

Impacts on special status fish and wildlife, on movement of native resident or migratory fish, and on the use of native wildlife nursery sites are expected to be less than significant after mitigation, but these potential impacts would require further evaluation based on specific characteristics of the

project area and the fish and wildlife species present there. These impacts could occur through habitat disturbance by control workers and by habitat disturbance and increased erosion due to mechanical control, flooding, or covering. Herbicide application could directly impact fish and wildlife, although it should be noted that the toxicity of imazapyr and glyphosate to animals is low. Herbicide impacts would be more likely to occur through acute exposure than through food web exposure. Imazapyr and glyphosate have a low potential for bioaccumulation and biomagnifications, meaning that adverse impacts to fish and wildlife is unlikely to occur through food web exposures (Kerr 2010). Imazapyr and glyphosate's potential to bioaccumulate is low because they are highly soluble in water, and have low solubility in lipids, meaning that they do not concentrate in animal fat or organ tissue (Leson and Associates 2005, Kerr 2010). Because imazapyr and glyphosate have a low potential for bioaccumulation, the primary concern for impacts to fish and wildlife is acute exposure.

Acute exposure could occur when herbicides are present at relatively high concentrations during and immediately following application. Herbicide solutions have the potential to affect organisms that live in the water column, including algae, non-target plants, fish and aquatic invertebrates. While some other receptors such as mammals and birds may spend a considerable portion of their time in the water, they are generally more likely to be affected by other exposure routes, primarily dermal contact during application and incidental ingestion of contaminated sediment during foraging (Kerr 2010). The period during which acute exposure could occur is short, because imazapyr rapidly degrades via photolysis and glyphosate is inactivated through adsorption to sediment. While bonded to sediments, glyphosate is slowly broken down by microbial activity. The maximum proposed application rate of imazapyr for control of *Spartina* does not result in aquatic concentrations or terrestrial doses that exceeded screening levels for toxicity to aquatic or terrestrial mammals, birds, invertebrates, or benthos, even under extremely conservative assumptions and risk scenarios (Patten 2003, Leson and Associates 2005). The more stringent screening levels for acute toxicity to endangered fish species are marginally exceeded by the highest measured and modeled imazapyr concentrations in the leading edge of an incoming tide (ibid). The conditions and assumptions for these concentrations are extremely conservative and would only be present momentarily and in a small volume of water. The concurrent presence of an endangered fish species is considered highly unlikely.

A number of field studies demonstrated that imazapyr rapidly dissipated from water within several days and no detectable residues of imazapyr were found in either water or sediment within two months (Leson and Associates 2005). In estuarine systems, dilution of imazapyr with the incoming tides contributes to its rapid dissipation (Leson and Associates 2005, Kegley 2008). Aquatic degradation studies under laboratory conditions demonstrated rapid initial photolysis of imazapyr with reported half-lives ranging from 3 to 5 days (SERA 2004). The two primary photodegradation products were rapidly degraded with half-lives less than or equal to 3 days and eventual mineralization to carbon dioxide (Entrix 2003). Degradation rates in turbid and sediment-laden waters, common in estuarine environments and in the project area, are expected to be lower than those determined under laboratory conditions. The San Francisco Invasive *Spartina* Project's National Pollutant Discharge Elimination System (NPDES) water quality monitoring at treatment sites over the past several years has found a standard reduction in imazapyr in the adjacent surface water of more than 95% one-week after treatment over the amount present immediately after the application (Kerr 2010).

As noted above, glyphosate's loss from water occurs mainly through sediment adsorption and microbial degradation (Kerr 2010). Energetic tidal cycles and tidal currents effectively disperse bound (adsorbed) glyphosate and surfactants and dilute them in microbially active suspended

sediment. Studies of the fate of glyphosate and surfactants applied in tidal marshes and mudflats have reported that concentrations of both substances dropped below detection levels as soon as two tidal cycles (one day) to seven days (Kroll 1991, Paveglio et al. 1996) after application, although senescent *Spartina* rhizomes can retain glyphosate for long periods (two years or longer) before the rhizomes themselves decay (Kilbride and Paveglio 2000).

A Hazardous Materials Spill and Containment Plan will be implemented at control sites to avoid or minimize potential damage from fuel, hydraulic fluid, or other toxic substances to sensitive habitats. (*See Mitigation Measures in the Hydrology and Water Quality Section of this Initial Study).*

V. CULTURAL RESOURCES. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Cause a substantial adverse change in the significance of a historical resource as defined in '15064.5?		X		
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to '15064.5?		X		
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?		X		
d) Disturb any human remains, including those interred outside of formal cemeteries?		X		

THRESHOLDS OF SIGNIFICANCE: This Initial Study considers to what degree the proposed project would cause (a) physical changes in known or designated historical resources, or in their physical surroundings, in a manner that would impair their significance; (b) physical changes in archaeological sites that represent important or unique archaeological or historical information; (c) unique paleontological resource site or unique geologic feature; or (d) disturbance of human burial locations.

DISCUSSION:

The project involves only shallow ground disturbance of the top few inches of the marsh. Some marsh areas currently dominated by *Spartina* are likely to contain culturally significant resources that could be disturbed by control activities. Based on a preliminary consultation with the Wiyot Tribe's environmental services director, this impact could be mitigated to a less than significant level by training control workers to recognize culturally significant resources. If such resources are uncovered during control activities, work would be halted while a tribal representative was consulted to determine how best to protect the resource in question.

VI. GEOLOGY AND SOILS. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				X
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.				X

ii) Strong seismic ground shaking?				X
iii) Seismic-related ground failure, including liquefaction?				X
iv) Landslides?				X
b) Result in substantial soil erosion or the loss of topsoil?	X			
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?				X
d) Be located on expansive soil, as defined by the California Building Code (2007), creating substantial risks to life or property?				X
e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?				X

THRESHOLDS OF SIGNIFICANCE: This Initial Study considers project-related effects that could involve or result from: (a) damage to project elements as a direct result of fault movement along a fault identified in the Alquist-Priolo study or other known fault; (b) damage to project elements as a direct or indirect effect of seismically derived ground movement; (c) damage to project elements because of landslides that are not seismically related; (d) project-derived erosion by water or wind of more than a minimal volume of earth materials; (e) project-derived or project-caused secondary instability of earth materials that could subsequently fail, damaging project elements or other sites or structures; (f) location of project elements on expansive soils that are identified by professional geologists, which could result in damage to project elements or other sites or structures.

DISCUSSION: No structures will be built as part of this project. The project area is very seismically active; the North Coast of California is the location of numerous fault lines and is near the intersection of three tectonic plates, and Humboldt County is very seismically active and susceptible to strong seismic ground shaking. However, project activity is not likely to increase exposure to seismic hazards. Control staff will be working in level areas, and will therefore not be exposed to increased risk of loss, injury or death from seismic activity.

The project may result in temporary increases in erosion from marshes over a one to two year period during which vegetation will be greatly reduced by control activities. This effect will be mitigated by the *Spartina* mulch that will be left on the marsh surface after mechanical control activities. The project may also result in bank erosion in tidal channels due to the removal of *Spartina* which may be stabilizing channel banks. These impacts would be reduced to the extent that herbicide treatment is used and dead vegetation is left in place during the period of native marsh plant colonization. The magnitude of these impacts is reduced by the phased nature of the project; *Spartina* control will not occur throughout the project area in a given year. Additional analysis of this impact is required to determine its level of significance.

Based on the above findings, staff concludes that the project will not result in substantial adverse impacts relating to geology and/or soils.

VII. GREEN HOUSE GAS EMISSIONS. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?			✓	
b) Conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases?			✓	

THRESHOLDS OF SIGNIFICANCE: This initial study considers to what degree the project would contribute to greenhouse gas emissions and global warming.

DISCUSSION: The gases believed to be most responsible for global warming are water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Enhancement of the greenhouse effect can occur when concentrations of these gases exceed the natural concentrations in the atmosphere. Of these gases, CO_2 and CH_4 are emitted in the greatest quantities from human activities. Emissions of CO_2 are largely by-products of fossil fuel combustion, whereas CH_4 results from off-gassing associated with agricultural practices and landfills.

Globally, climate change has the potential to impact numerous environmental resources through potential, though uncertain, impacts related to future air temperatures and precipitation patterns. The projected effects of global warming on weather and climate are likely to vary regionally, but are expected to include the following direct effects:

1. Higher maximum temperatures and more hot days over nearly all land areas;
2. Higher minimum temperatures, fewer cold days and frost days over nearly all land areas;
3. Reduced diurnal temperature range over most land areas;
4. Increase of heat index over land areas; and
5. More intense precipitation events.

Also, there are many secondary effects that are projected to result from global warming, including global rise in sea level, impacts on agriculture, changes in disease vectors, and changes in habitat and biodiversity. While the possible outcomes and the feedback mechanisms involved are not fully understood, and much research remains to be done, the potential for substantial environmental, social, and economic consequences over the long term may be great.

The topic of global warming has been a focus of discussion within the scientific community for quite some time; however, statutory measures or actions to reduce emissions have only been recently implemented by the State of California. From a land use perspective, the recently adopted legislation ***(SB 375 & AB 32)*** strive to reduce the levels of greenhouse gases through the practice of smart-growth or mixed use development. As of now, greenhouse gas emission thresholds or limits have not been legally established for the Northern California coast.

Spartina densiflora can fix a large amount of carbon, and past research suggested that it may fix more carbon on an annual per-acre basis than native marsh species such as saltgrass (*Distichlis spicata*). However, these calculations do not account for community changes that are likely to affect net primary productivity. For example, recent studies of San Francisco Bay suggested that invasive *Spartina alterniflora* alters community composition in mudflats and in native marshes, resulting in a reduction in sediment microalgal primary productivity and microalgal Chlorophyll *a* net primary productivity in invasive *Spartina*-dominated marshes compared to mudflats and native *Spartina*- or pickleweed-dominated marshes (Tyler and Grosholz, *in press*). In light of the conflicting and incomplete data available, it is not currently feasible to assess the impact of restoring native marsh species on marsh carbon fixation rates.

Some amount of GHG emissions would result from control activities. Emissions would result from the operation of handheld brushcutters or large tracked vehicles for mechanical control, and from the use of vehicles to access control sites for all control methods. While *Spartina* would typically be left as mulch or dead intact plants on the marsh, in some instances, such as with manual removal, vehicles may be used to haul removed *Spartina* to composting or other disposal sites. However, these activities

would be temporary, with a relatively low number of machines operating for a period of several years. The amount of greenhouse gases generated by these activities would be expected to be less than significant, but this needs to be evaluated through a detailed analysis of potential emissions.

Based on the discussion above, the project will not significantly increase greenhouse gas emissions or conflict with plans, policies, or regulations on greenhouse gas emissions.

VII. HAZARDS AND HAZARDOUS MATERIALS. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	X			
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?		X		
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?		X		
d) Be located on a site which is included on a list of hazardous materials sites complied pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?			X	
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?			X	
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?			X	
g) Impair implementation of, or physically interfere with an adopted emergency response plan or emergency evacuation plan?			X	
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized area or where residences are intermixed with wildlands?			X	

THRESHOLDS OF SIGNIFICANCE: This Initial Study considers to what degree the proposed project would involve: (a) potential storage or use, on a regular basis, of chemicals that could be hazardous if released into the environment; (b) operating conditions that would be likely to result in the generation and release of hazardous materials; (c) use of hazardous materials, because of construction-related activities or operations, within a quarter-mile of an existing or proposed school; (d) project-related increase in use intensity by people within the boundaries of, or within two miles of, the Airport Planning Areas; (e) project-derived physical changes that would interfere with emergency responses or evacuations; (f) potential major damage because of wildfire.

DISCUSSION There will be no hazardous materials associated with the project other than temporary short-term materials such as fuel and oil used by control equipment, and imazapyr and glyphosate herbicides and associated surfactants.

Sensitive Receptors

Sensitive receptors include hospitals, schools, and residences near the bay margin that are in close proximity (e.g., within 0.25 mile) to areas infested with non-native *Spartina*. These residential areas include neighborhoods in Eureka, Arcata, King Salmon, Fields Landing, Port Kenyon, Samoa, and Manila. Birders, bicyclists, joggers, pedestrians, and users of recreational facilities (including parks, marinas, launch ramps, fishing piers, and beaches) in the project area also could be sensitive receptors. For example, several possible treatment sites are located near recreational trails, including PALCO Marsh and Arcata Marsh.

Potential impacts

Three primary types of health and safety impacts are associated with the treatment of non-native *Spartina* infestations:

- Safety impacts to workers associated with manual labor and the use of potentially dangerous equipment during treatment activities
- Health effects to workers and the public associated with the routine application of imazapyr herbicide and/or imazapyr/glyphosate herbicide mixture (including surfactants and dyes) and
- Health effects associated with accidents involving release of herbicide or other hazardous materials into the environment

Implementation of manual or mechanical methods to treat non-native *Spartina* may result in injuries to workers during treatment activities. The impact would depend on the specific methods and equipment used and the size of the area to be treated. Workers involved in digging and pulling, pruning, mowing, mechanical smothering, mechanical ripping and shredding, prescribed burning, temporary diking, and covering would be exposed to the risk of cuts, bruises, or sprains associated with working in the mud, from manual labor and use of mechanized equipment. Workers involved in mechanical removal of herbicides would be exposed to the risk of hearing damage from chronic exposure to equipment noise. Workers involved in manual spraying of herbicides could be subject to similar types of injuries. Accidents involving machinery could cause serious injury and falls might occur when traversing uneven terrain or upon contact with slippery soils. This impact would be mitigated by implementation of mitigation measure HS-1 below.

MITIGATION HS-1: Worker Injury from Accidents Associated with Manual and Mechanical Non-native *Spartina* Treatment. Appropriate safety procedures and equipment, including hearing protection, shall be used by workers to minimize risks associated with manual and mechanical treatment methods. Workers shall receive safety training appropriate to their responsibilities prior to engaging in any treatment activities.

There is always the possibility when equipment is operating, that an accident could occur and fuel could be released into a marsh, riparian area, or waterway. This could happen at any time in any location, and is not peculiar to this site or this project. This type of work occurs all the time without incident, and is therefore determined not to represent a significant impact. Equipment on site during construction will be required to have emergency spill cleanup kits immediately accessible in the case of any fuel or oil spills and a Hazardous Materials Spill Prevention and Containment Plan. Approved by the North Coast Regional Water Quality Control Board, shall be implemented to minimize potential spill impacts.

Toxicity of Imazapyr and Glyphosate

Mild irritation to the eyes can result from accidental splashing with imazapyr. This effect will be minimized or avoided by exercising care to reduce splashing and wearing goggles during the handling of the herbicide. Leson and Associates (2005) evaluated potential impacts to human health and safety from imazapyr application for *Spartina* control. Their analysis was based on a

risk assessment for the application of imazapyr in forestry applications, which evaluated worst-case scenarios for both workers and members of the general public, e.g., recreational users or residents. Based on this assessment, typical exposures to imazapyr do not lead to doses that exceed screening levels for either workers or members of the general public. Workers and members of the general public are not expected to experience substantial risk from acute or longer-term exposure to imazapyr.

Glyphosate has relatively low oral and dermal acute (short-term) toxicity (USEPA 1993). Eye effects from human exposures to herbicides containing glyphosate based on 1,513 calls to poison treatment centers in the United States (Acquavella et al. 1999) included transient minor symptoms (70 percent), no injury (21 percent), and temporary injury (2 percent). Inhalation toxicity tests using the isopropylamine salt of glyphosate (the form found in Aquamaster™) resulted in low potential for acute inhalation toxicity (>4.24 mg/L) and no mortality of the test species (rats). These tests resulted in a Category IV (practically non-toxic) rating. Studies of the acute toxicity of glyphosate herbicides due to ingestion found that the mean amount of glyphosate herbicide ingested in fatal poisonings was 200 mL (6.3 ounces) (Sawada et al. 1988) and 263 mL (Tominack et al. 1991). Several chronic (long-term) toxicity and carcinogenicity studies using rats, mice, and beagle dogs resulted in no effects based on the parameters examined, or resulted in findings that glyphosate was not carcinogenic. The USEPA has classified glyphosate as a Group D oncogen – not classifiable as to human carcinogenicity, based on inadequate evidence for carcinogenicity in animals (USEPA 2001). However, an updated (2002) literature review prepared by the Northwest Coalition for Alternatives to Pesticides (NCAP) noted that a recent Swedish study of hairy cell leukemia found that people who were occupationally exposed to glyphosate herbicides had a threefold higher risk of contracting that disease. The NCAP report also noted that a similar study of people with non-Hodgkins lymphoma found exposure to glyphosate herbicides was associated with an increased risk of about the same size (NCAP 2002). The NCAP report also summarizes other studies where some increased risk of carcinogenesis may result from exposure to glyphosate herbicides. Those conclusions are disputed by the US Environmental Protection Agency (NCAP 2002).

Toxicity of Surfactants

Impacts to human health could also result from exposure to surfactants that are used with glyphosate and imazapyr, and trace impurities in glyphosate and imazapyr or its surfactants. Information on the toxicity of surfactants, impurities, and chemical mixtures is limited. Mammalian studies indicate that the surfactants Agridex®, R-11®, and LI-39 700® are practically nontoxic to rats and rabbits, but are rated as corrosive, based on eye irritation in rabbits. LI-700® is also rated corrosive based on dermal irritation in rabbits. However, the concentrations of surfactant required to elicit these responses, while sometimes lower than that of glyphosate itself, are substantially greater than the concentrations that would be applied to treat non-native *Spartina*.

Trace impurities in glyphosate at levels less than or equal to 0.1 parts per million (ppm) include N nitroso-glyphosate (NNG) (USFS 1995). Monsanto Agricultural Company has evaluated NNG for mutagenicity, carcinogenicity, and teratogenicity, and found that this chemical does not elicit negative effects and is excreted unchanged (Washington State 1993).

Project Worker Exposure Effects

The potential for human health effects from the application of herbicides depends on the potential exposure routes, and the toxicity of the herbicide and associated surfactants and impurities.

An exposure route describes the ways in which people can be exposed to contaminants in a particular area. Workers could be exposed to imazapyr or glyphosate and other substances if they

inhale spray droplets or windblown soil particles; if they touch the liquid herbicide during mixing and loading (dermal contact); or by ingesting small amounts of soil or sediment containing herbicide residues (e.g., for example, sediment clinging to hands or face). Based on the information summarized above, it is highly unlikely that workers applying glyphosate and surfactants with hand-held sprayers or from vehicles or boats would willfully inhale or ingest the quantities that would cause serious injury.

Some spray drift may occur during application of herbicide using boats, trucks, and all-terrain vehicles (ATVs) mounted with a boom sprayer or spot spraying with a hose from these vehicles may also be conducted.

All herbicide application methods involve the potential for dermal (skin) contact from splashes during mixing and loading. As noted above, primary health effects include eye and skin irritation. In California, glyphosate ranks high among pesticides causing illness or injury to workers, who report numerous incidents of eye and skin irritation from splashes during mixing and loading. Use of personal protective equipment (PPE), including protective eyewear, as specified on the product label would minimize this risk. Proper handling of glyphosate and the surfactants in accordance with the labeling requirements would reduce the potential for eye and dermal irritation in workers.

Mitigation HS-2: Worker Health Effects from Herbicide Application. Appropriate health and safety procedures and equipment, as described on the herbicide or surfactant label, including PPE as required, shall be used by workers to minimize risks associated with chemical treatment methods. Only certified or licensed herbicide applicators shall mix and apply herbicide.

Health Effects to the Public from Herbicide Application. Routine application of imazapyr and glyphosate herbicides and surfactants to treat non-native *Spartina* may result in adverse health effects to the public, including area residents, recreational visitors, and sensitive subpopulations including children and the elderly. The impact would depend on the herbicide application method, the specific site location, potential receptors in the area, and the size of the area to be treated.

Drift of chemical spray could potentially affect residents living in close proximity to the affected areas, or recreational visitors to the area. Drift from ground application can extend up to about 250 feet, with pesticide concentrations diminishing as the drift gets farther from the source.
Glyphosate and surfactants are only slightly toxic via the inhalation pathway (Dow 2004; Monsanto 2001 and 1998; US EPA 1993). The US EPA considers imazapyr moderately toxic if inhaled (US EPA 2006). (See information in Impact HS-1, above on the inhalation toxicity of glyphosate.)
Potential imazapyr and glyphosate exposure routes for the public include:
• Inhalation of fine imazapyr and glyphosate spray droplets or windblown soil particles to which glyphosate is adsorbed
• Dermal (skin) contact with airborne imazapyr or glyphosate or residues on vegetation, soil, sediments, or surface water
• Incidental ingestion of imazapyr or glyphosate in soil or sediments by inadvertently swallowing soil or sediment (e.g., by touching dirty hands to mouth or by placing dirty objects, such as toys, into the mouth); this exposure route is of greatest importance for children, and
• Ingestion of imazapyr or glyphosate by eating food containing imazapyr or glyphosate residues, such as berries, garden vegetables, fish, or shellfish.
People who use treated areas for recreation could come into direct contact with vegetation that has recently been sprayed, thus posing a minor risk of skin irritation. Individuals could be exposed to glyphosate and imazapyr and surfactants while playing, walking, swimming, or fishing at or near

treatment sites.
Glyphosate and surfactants are poorly absorbed through the skin (USEPA 1993), therefore dermal contact is not likely to cause significant health effects. Imazapyr has low acute dermal toxicity (USEPA 2006).
People who consume plants or wildlife (including fish and shellfish) harvested near the spray area could be exposed to glyphosate and surfactants if present in the plant or animal. However, glyphosate and imazapyr are minimally retained and rapidly eliminated in fish, birds, and mammals (USEPA 2001, 2006). Based on these characteristics, and the water solubility and rapid degradation of glyphosate, it is not expected to bioconcentrate in aquatic organisms; therefore glyphosate poses minimal risk to humans via consumption of aquatic organisms.

Based on the discussion above, imazapyr and glyphosate and surfactants would have a low potential to cause adverse human health impacts. However, the potential impacts should be more fully evaluated. The following mitigation measures are suggested to further reduce health risks from exposure to chemical treatment.

MITIGATION HS-3: Health Effects to the Public from Herbicide Application. To minimize risks to the public, mitigation measures for chemical treatment methods related to timing of herbicide use, area of treatment, and public notification, shall be implemented by entities engaging in treatment activities as identified below:
• Herbicide application shall be managed to minimize potential for herbicide drift, particularly in areas where the public could be affected. Herbicide shall not be applied when winds are below 3 mile per hour or in excess of 10 miles per hour or when inversion conditions exist (per Supplemental Labeling for Aquamaster for Aerial Application in California Only and per labeling for Habitat), or when wind could carry spray drift into inhabited areas. This condition shall be strictly enforced by the implementing entity.
• Colored signs shall be posted at and/or near any public trails, boat launches, or other potential points of access to herbicide application sites a minimum of 24 hours prior to treatment. These signs shall inform the public that the area is to be sprayed with imazapyr and/or glyphosate herbicide for weed control, and that the spray is harmful if inhaled. They will advise “no entry” for humans and animals until a minimum of eight (8) hours after treatment, and that date and time will be stated. A 24-hour contact number shall be provided.
• Application of herbicides shall be avoided near areas where the public is likely to contact water or vegetation as follows:

A. Application of herbicides in or adjacent to high use areas shall not be allowed within 24 hours prior to weekends and public holidays.

B. If a situation arises (due to weather or other variables) that makes it necessary to treat high-use areas on weekends or holidays, the areas shall be closed to the public for 24 hours before and after treatment.

• At least one week prior to application, signs informing the public of impending herbicide treatment shall be posted at prominent locations within a 500-foot radius of treatment sites where homes, schools, hospitals, or businesses could be affected. Schools and hospitals within 500 feet of any treatment site shall be separately noticed at least one week prior to the application.
•

Health Effects to Workers or the Public from Accidents Associated with Chemical Treatment.

Application of imazapyr and/or glyphosate and surfactants to treat non-native *Spartina* may result in adverse health effects to workers or the public from reasonably foreseeable upset or accident

conditions. Short-term, acute exposure to hazardous chemicals could occur during accident or upset conditions. Exposures could result from accidental spills or improper disposal of chemicals. The risk of health effects is highest for workers during non-native *Spartina* treatment. The impact would depend on the specific site location, potential receptors in the area, and weather conditions at the time of the accident.

MITIGATION HS-4: Health Effects to Workers or the Public due to Accidents Associated with Non-native *Spartina* Treatment. Appropriate health and safety procedures and equipment shall be used to minimize risks associated with non-native *Spartina* treatment methods, including exposure or spills of fuels, petroleum products, and herbicides. These shall include the preparation of a contingency plan including a Spill Prevention, Control and Countermeasures (SPCC) plan (see also the mitigation measures in Water Quality Section below).

The proposed project will not affect any emergency response plans.

It is possible that a spark from mechanical equipment could cause a fire in *Spartina* marshes or riparian areas. However, the marsh and riparian soils are wet and regularly inundated. Large wildland fires are therefore extremely unlikely to occur in the project area.

The project area includes marshes adjacent to Murray Field Airport, within the airspace analysis zone identified in the 1993 Airport Land Use Compatibility Plan for Murray Field. The project area includes areas adjacent to the City owned Samoa airstrip. Control activities would be coordinated with airport authorities to avoid any safety hazards.

The project's potential impacts to public health and worker health should be thoroughly evaluated before a determination of the level of significance of this impact after mitigation is made.

VIII. HYDROLOGY AND WATER QUALITY. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Violate any water quality standards or waste discharge requirements?	X			
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g. the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?				X
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner, which would result in substantial erosion or siltation on or off-site?	X			
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner, which would result in flooding on- or off-site?			X	

e)	Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?			X	
f)	Otherwise substantially degrade water quality?	X			
g)	Place housing within a 100-year flood hazard area as mapped on a Federal Flood Hazard Boundary of Flood Insurance Rate Map or other flood hazard delineation map?				X
h)	Place within a 100-year flood hazard area structures, which would impede or redirect flood flows?				X
i)	Expose people or structures to a significant risk or loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?				X
j)	Result in inundation by seiche, tsunami, or mudflow?				X

THRESHOLDS OF SIGNIFICANCE: This Initial Study considers to what degree the proposed project would involve: (a) improvements that would violate standards set for water quality and for discharge of waste water; (b) use of, or interference with ground water such that the amount of flow of groundwater is adversely impacted; (c) drainage improvements that would alter or cause an increase in amount or flow of drainage, or that would affect the free-flow of a stream or river or cause an increase in silt runoff as to cause adverse impact; (d) added runoff from the site that would exceed the capacity of drainage facilities; (e) the creation of polluted runoff or other general adverse water quality impacts; (f) the placement of housing or other structures within the 100-year flood plain, or other area subject to flooding; (g) development in such a manner or location that it would be adversely affected by seiche, tsunami or mudflow.

DISCUSSION: The project may result in temporary increases in erosion from marshes over a one to two year period during which vegetation will be greatly reduced by control activities. This effect will be mitigated by the *Spartina* mulch that will be left on the marsh surface after mechanical control activities. The project may also result in bank erosion in tidal channels due to the removal of *Spartina* which may be stabilizing channel banks. These impacts would be reduced to the extent that herbicide treatment is used and dead vegetation is left in place during the period of native marsh plant colonization. The magnitude of these impacts is reduced by the phased nature of the project; *Spartina* control will not occur throughout the project area in a given year. However, increased fine sediment inputs resulting from project activities may be less than significant in the context of the project area sediment budget. Additional data on the sediment budget of the project area would need to be evaluated in order to make this determination.

Water quality may be impacted by spills of herbicides or other hazardous materials, such as fuel. This potential impact to water quality will be avoided by the implementation of the mitigation measures listed below.

Herbicides (imazapyr and possibly glyphosate) will not result in degradation of water quality when used by the project in accordance with the mitigation measures specified below. Using the various application methods, herbicide mixtures will be applied directly onto the foliage or stems of *Spartina* during low tides when the sediment is exposed. Herbicide mixtures may be directly released to surface waters when the incoming tide washes the remaining herbicide mixture off the foliage and the exposed sediment. The concentrations in water will be determined by canopy interception of the applied herbicide, uptake into the plants, uptake into the root zone, and aerial drift. Since application of herbicides would take place during low tide and low wind conditions, the herbicide would likely be absorbed by plants for a minimum of several hours (up to several weeks in high marsh) following application resulting in lower quantities of imazapyr, glyphosate or

surfactants entering the water. The Leson & Associates report (2005) evaluated the fate of the herbicide in water after application onto *Spartina* based on the herbicide's physical/chemical characteristics and the potential concentrations in water determined from theoretical models and results from field dissipation studies.

In water, imazapyr rapidly degrades via photolysis (Leson and Associates 2005, Patten 2003). A number of field studies demonstrated that imazapyr rapidly dissipated from water within several days and no detectable residues of imazapyr were found in either water or sediment within two months (Leson and Associates 2005). In estuarine systems, dilution of imazapyr with the incoming tides contributes to its rapid dissipation (Leson and Associates 2005, Kegley 2008). Aquatic degradation studies under laboratory conditions demonstrated rapid initial photolysis of imazapyr with reported half-lives ranging from 3 to 5 days (SERA 2004). The two primary photodegradation products were rapidly degraded with half-lives less than or equal to 3 days and eventual mineralization to carbon dioxide (Entrix 2003). Degradation rates in turbid and sediment-laden waters, common in estuarine environments and in the project area, are expected to be lower than those determined under laboratory conditions. The San Francisco Invasive *Spartina* Project's National Pollutant Discharge Elimination System (NPDES) water quality monitoring at treatment sites over the past several years has found a standard reduction in imazapyr in the adjacent surface water of more than 95% one-week after treatment over the amount present immediately after the application (Kerr 2010). Kegley (2008) also supports the conclusion that tidal flushing of sites where imazapyr is applied in estuarine settings will result in rapid dilution and degradation of the herbicide.

Glyphosate's loss from water occurs mainly through sediment adsorption and microbial degradation (Kerr 2010). Energetic tidal cycles and tidal currents effectively disperse bound (adsorbed) glyphosate and surfactants and dilute them in microbially active suspended sediment. Studies of the fate of glyphosate and surfactants applied in tidal marshes and mudflats have reported that concentrations of both substances dropped below detection levels as soon as two tidal cycles (one day) to seven days (Kroll 1991, Paveglio et al. 1996) after application, although senescent *Spartina* rhizomes can retain glyphosate for long periods (two years or longer) before the rhizomes themselves decay (Kilbride and Paveglio 2000).

The project will not create or contribute runoff.

The project does not include development that would impact the quality or quantity, rate or flow, and removal, recharge or addition to groundwater supplies.

Due to the known seismic activity in the Pacific Rim, a tsunami could impact the project area. It is expected that the impact of a tsunami on Humboldt Bay would primarily occur along the north and south spits and the King Salmon and Fields Landing areas, which are located directly across from the opening to Humboldt Bay. However, the project will not create significant additional risk.

The following mitigation measures would reduce the project's potential impacts to water quality.

MITIGATION WQ-1: Herbicides shall be applied directly to plants and at low or receding tide to minimize the potential application of herbicide directly on the water surface, as well as to ensure proper dry times before tidal inundation. Herbicides shall be applied by a certified applicator and in accordance with application guidelines and the manufacturer label.
The Control Program shall obtain coverage under the State NPDES Permit for the Use of Aquatic

Herbicides and any necessary local permits. A monitoring program shall be implemented as part of the NPDES permit, and shall include appropriate toxicological studies to determine toxicity levels of the herbicide solutions being used. The Control Program shall use adaptive management strategies to refine herbicide application methods to increase control effectiveness and reduce impacts.

MITIGATION WQ-2: Herbicides shall be applied by or under the direct supervision of trained, certified or licensed applicators. Herbicide mixtures shall be prepared by, or under the direct supervision of trained, certified or licensed applicators. Storage of herbicides and adjuvants/surfactants on-site shall be allowed only in accordance with a spill prevention and containment plan approved by the North Coast Regional Water Quality Control Board; on-site mixing and filling operations shall be confined to areas appropriately bermed or otherwise protected to minimize spread or dispersion of spilled herbicide or surfactants into surface waters.
When containers of herbicide larger than the standard 2.5 gallon are used, these containers must remain in the staging area(s) on a levee or other appropriate upland site. These larger containers will not be allowed into the marsh, and a spill response plan must be in place in the event of an accidental discharge, to ensure that herbicide does not reach the marsh or surface waters.

MITIGATION WQ-3: Fueling operations or storage of petroleum products shall be maintained off-site, and a spill prevention and management plan shall be developed and implemented to contain and clean up spills. Transport vessels and vehicles, and other equipment (e.g., mowers, pumps, etc.) shall not be serviced or fueled in the field except under emergency conditions; hand-held gas-powered equipment shall be fueled in the field using precautions to minimize or avoid fuel spills within the marsh. Other, specific best management practices shall be specified as appropriate in project-specific Waste Discharge Requirements.

The project's potential water quality impacts should be thoroughly evaluated to determine their level of significance after mitigation.

IX. LAND USE AND PLANNING. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Physically divide an established community?				X
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?			X	
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?				X

THRESHOLDS OF SIGNIFICANCE: This Initial Study considers to what degree the proposed project would (a) divide an established community or conflict with existing land uses within the project's vicinity, such as agriculture resources; (b) conflict with the Eureka, Arcata, and Humboldt County General/Coastal Plans designation, policies, and zoning ordinances; (c) conflict with applicable environmental plans and protection measures enforced by regulatory agencies that have jurisdiction over the project, such as habitat conservation plans or a natural community

conservation plan.

DISCUSSION: The majority of the project area is zoned Natural Resources, Ag, and Coastal Dependent Industrial. Project activities involve only a shift in the composition of vegetated marshes, and therefore do not conflict with zoning designations.

The project is within the Coastal Zone and therefore subject to applicable coastal zone regulations. The project does not conflict with the Local Coastal Plan, or any applicable habitat conservation plan or natural community conservation plan.

Based on the above discussion, the proposed project is consistent with conditionally permitted uses, zoning, and general plan designations in which it is located Therefore, the project will not divide the community and will not result in an adverse impact to land use and planning.

X. MINERAL RESOURCES. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the State?				X
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?				X

THRESHOLDS OF SIGNIFICANCE: This Initial Study considers to what degree the proposed project would interfere with the extraction of commodity materials or otherwise cause any short-term or long-term decrease in the availability of mineral resources that would otherwise be available for construction or other consumptive uses.

DISCUSSION: The project will not involve the use of mineral resources, nor would it make mineral resources unavailable, as it only involves activities designed to change the plant species present in vegetated tidal marshes and riparian areas. The proposed project will not result in the loss of availability of a State or locally known mineral resource.

XI. NOISE. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Expose persons to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?			X	
b) Expose persons to or generate excessive ground borne vibration or ground borne noise levels?			X	
c) Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?				X
d) Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?				X
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?				X

f)	For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?				X

THRESHOLDS OF SIGNIFICANCE: This Initial Study considers whether the proposed project would produce: (a) sound-pressure levels contrary to the noise standards in the project area; (b) long-term ground vibrations and low-frequency sound that would interfere with normal activities and which is not currently present in the project area; (c) a substantial increase in ambient short-term or long-term sound-pressure levels; (d) changes in noise levels that are related to operations, not construction-related, which will be perceived as increased ambient or background noise in the project area.

DISCUSSION: Acoustic Terminology

Noise is often defined as unwanted sound, and thus is a subjective reaction to characteristics of a physical phenomenon. Researchers have generally agreed that "A-weighted" sound pressure levels (abbreviated as dBA, A-weighted sound pressure levels are an expression of the relative loudness of sounds in air as perceived by the human ear) are very well correlated with community reaction to noise. The unit of sound level measurement is the decibel. Variations in sound levels over time are represented by statistical descriptors, and by time-weighted composite noise measures such as the Day-Night Average Level (Ldn), or the Community Noise Equivalent Level (CNEL).

The decibel notation used for sound levels describes a logarithmic relationship of acoustical energy, as such; sound levels cannot be added or subtracted in the conventional arithmetic manner. For example, a doubling of acoustical energy results in a change of 3 dBA, which is considered to be barely perceptible. A ten-fold increase in acoustical energy yields a 10 dBA change, which is subjectively like a doubling of loudness.

Community noise is commonly described in terms of the "ambient" noise level, which is defined as the all-encompassing noise level associated with a given noise environment. A common statistical tool to measure the ambient noise level is the average, or equivalent, sound level (Leq). The Leq measurement corresponds to a steady-state sound level containing the same total foundation of the composite noise descriptors such as Ldn and CNEL, and shows very good correlation with community response to noise.

Noise levels vary greatly in different portions of the project area. However, the majority of the project area is adjacent to natural areas or agricultural areas where the noise level is low. Noises in the vicinity of these portions of the project area are related primarily to wildlife, livestock, and roadway traffic in some areas.

The project area includes portions of the Cities of Eureka and Arcata and unincorporated Humboldt County. The following noise standards are applicable in each of those jurisdictions:

The City of Eureka's adopted General Plan specifies standards for non-transportation and transportation noise sources. The goal of the General Plan with regard to noise exposure is to protect Eureka residents from the harmful and annoying effects of exposure to excessive noise. For non-transportation related noise, the maximum allowable noise at the property line of lands designated for noise-sensitive uses cannot exceed 65dB (nighttime) to 70dB (daytime).

The City of Arcata's existing General Plan Noise Element establishes two sets of criteria for evaluating noise impacts. The Environmental Protection Agency's land use compatibility table is used as a guide for establishing acceptable and unacceptable noise environments for various types of land uses. The City of Arcata Noise Element establishes a "Normally Acceptable" exterior noise

level standard of 55 dBA Ldn for residential uses. A "Conditionally Acceptable" exterior noise level standard of 70 dBA Ldn is allowed for new construction only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features are included in the design. Section 4.2 of the existing City of Arcata Noise Element (1985) also establishes "Enforcement Limits for Exterior Noise." These are contained within Table 1, Page 12 of the existing Arcata General Plan Noise Element. These criteria are used for evaluating a proposed new commercial or industrial noise source. The proposed project does not include a new commercial or industrial noise source.

Section 4.3 of the Noise Element also states, "The City shall enforce the State Noise Insulation Standards set forth in Title 25 of the California Administrative Code." This code requires that interior noise levels shall not exceed 45 dBA Ldn. This project does not involve the construction of structures that would require noise related insulation.

Section 6.5 of the Noise Element identifies construction activity as a source of intrusive noise for Arcata residents and Policy 4.6 establishes limits on the day time hours within which construction activity can take place.

The following Humboldt General Plan policy is relevant to noise generated by the project:

Existing and potential incompatible noise levels in problem areas should be reduced through operational or source controls where the County has responsibility for such controls.

The highest possible noise levels associated would result from the temporary use of mechanical control tools, primarily handheld brushcutters and an aquatic bobcat with flail and rototiller attachments. Under the Noise Elements of the adopted General Plans, general construction noise is generally considered acceptable because such noise, although loud and often annoying, is of limited duration and intensity. In the vicinity of sensitive receptors, such as residential areas, noisy construction activity must be limited to daylight hours. *Spartina* control activities will only take place during daylight hours. Therefore, the project will not generate noise in excess of established standards.

Changes in ambient noise levels resulting from the control activities in particular areas would be temporary, sporadic, and limited to the duration of work in the individual area, typically much less than a month. Therefore, ambient noise levels within the project area will not be permanently increased.

The project area includes marshes adjacent to Murray Field Airport, within the airspace analysis zone identified in the 1993 Airport Land Use Compatibility Plan for Murray Field. The project area includes areas adjacent to the City owned Samoa airstrip. Control activities would be temporary and short-term in duration. Workers would be required to utilize hearing protection in the event of potential exposure to high noise levels from airport activity.

Based on the discussion above, the proposed project will not result in the production of unacceptable noise levels.

XII. POPULATION AND HOUSING. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact

a) Induce substantial population growth in an area, either directly (e.g., by proposing new homes and/or businesses) or indirectly (e.g., through extension of roads or other infrastructure)?				X
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?				X
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?				X

THRESHOLDS OF SIGNIFICANCE: This Initial Study considers to what degree the proposed project would result in, or contribute to, population growth, displacement of housing units, demolition or removal of existing housing units, or any project-related displacement of people from occupied housing.

DISCUSSION:
No housing will be displaced and no growth inducement will result from the project. Therefore, the project will not result in substantial adverse impacts regarding population and housing.

XIII. PUBLIC SERVICES. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Fire protection?				X
b) Police protection?				X
c) Schools?				X
d) Parks?				X
e) Other public facilities?				X

THRESHOLDS OF SIGNIFICANCE: This Initial Study considers to what degree the proposed project would result in any changes in existing fire or police protection service levels, or a perceived need for such changes, as well as any substantial changes in the need for, or use of, schools, parks, or other public facilities.

DISCUSSION: The proposed project would involve removing an undesirable plant species from vegetated marshes in the project area to facilitate restoration of the native marsh plant community. The proposed project would not result in any new demands for public services and will therefore not result in an adverse impact on public services.

XIV. RECREATION. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?				X
b) Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?				X

THRESHOLDS OF SIGNIFICANCE: This Initial Study considers to what degree any aspect of the proposed project would be related to demand for recreational facilities or increase use of existing recreational areas such that those areas are physically degraded, including secondary effects such as degradation through over-use of environmentally sensitive areas.

DISCUSSION: The proposed project would involve removing an undesirable plant species from vegetated marshes in the project area to facilitate restoration of the native marsh plant community. The proposed project would not result in any new demands for recreational facilities and will not involve any construction of recreational facilities. The project will therefore not result in an adverse impact on recreation.

XV. TRANSPORTATION/TRAFFIC. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Exceed the capacity of the existing circulation system, based on an applicable measure of effectiveness (as designated in a general plan policy, ordinance, etc.), taking into account all relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?				X
b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?				X
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that result in substantial safety risks?				X
d) Substantially increase hazards due to design features (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?				X
e) Result in inadequate emergency access?				X
f) Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?				X

THRESHOLDS OF SIGNIFICANCE: This Initial Study considers to what degree, if any, the proposed project would be associated with (a) changes in traffic, circulation, or other changes that might be perceived as adverse, including traffic effects resulting from temporary construction-related changes; (b) any project-related changes in levels-of-service on County or State highways; (c) project-associated travel restrictions that would prevent emergency vehicles from reaching the locations where they were needed.

DISCUSSION: The project is not expected to change circulation patterns in the project area. The project will not have a significant adverse impact on transportation or traffic.

XVI. UTILITIES AND SERVICE SYSTEMS. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?				X

b)	Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?				X
c)	Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?				X
d)	Have insufficient water supplies available to serve the project from existing entitlements and resources (i.e., new or expanded entitlements are needed)?				X
e)	Result in a determination by the wastewater treatment provider, which serves or may serve the project that it does not have adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?				X
f)	Be served by a landfill with insufficient permitted capacity to accommodate the project's solid waste disposal needs?				X
g)	Violate any Federal, State, and local statutes and regulations related to solid waste?				X

THRESHOLDS OF SIGNIFICANCE: This Initial Study considers to what degree the proposed project would be related to: (a) a substantial demand for water supplies affecting existing entitlements and resources; (b) increase in runoff intensity that exacerbates drainage conditions and changes; and (c) insufficient provision for solid waste disposal.

DISCUSSION

The project will not require or result in the construction of any new wastewater or stormwater treatment facilities. Spartina would typically be left as mulch or dead intact plants on the marsh. This *Spartina* wrack would be expected to decompose *in situ* or in locations where it is deposited by tidal action. However, in some instances, such as with manual removal, Spartina may be hauled to composting or other disposal sites. The amount of material to be disposed of in this way is not expected to be significant, and would not exceed the permitted capacity of area landfills. No solid waste statutes or regulations will be violated.

The project will not result in any significant adverse impacts to utilities and service systems.

XVII. MANDATORY FINDINGS OF SIGNIFICANCE.		Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a)	Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	X			
b)	Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects).				X

c)	Does the project have environmental effects, which will cause substantial adverse effects on human beings, either directly or indirectly?	X			

DISCUSSION: The project's impacts on sensitive natural communities, special status plants, and fish and wildlife should be thoroughly evaluated to determine whether they are potentially significant after mitigation. Potential impacts to human health should also be thoroughly evaluated to determine their level of significance. No growth-related cumulative impacts are peculiar to this proposed project. This project is not contingent on or otherwise related to the development of additional facilities or any other project.

EARLIER ANALYSES

Earlier Analyses Used.

b) **Impacts Adequately Addressed**. The following effects from the above checklist were within the scope of and adequately analyzed in the document(s) listed above, pursuant to applicable legal standards.
N/A

c) **Mitigation Measures.** For effects that are "Less than Significant with Mitigation Incorporated," the following are mitigation measures that were incorporated or refined from the document(s) described above.
N/A

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